

Can a Two Person RFIC Team Love Data Management?



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CDNLive! 2008

Enabling the next generation of innovation

Overview



- Why deploy a design data management (DDM) system for a 2-person project?
- Questions addressed
 - Why DDM?
 - What are the requirements?
 - Which DDM system?
 - How to deploy it?
- Case study
 - Company and project description
 - Design flow
 - Realized benefits
- DDM integration
 - DDM integration with Cadence and other tools
 - Project architecture and deployment
 - User deployment

DDM and the Small Team



- DDM systems are normally associated with large teams
 - Large amount of files and data to organize
 - Groups in different physical sites & time zones
 - Multiple simultaneous access to libraries

- A clean and simple-to-use solution scales downward
 - Same motivations within a small team
 - Version control
 - Disjoint personnel schedules
 - Telecommuting
 - Different geographical locations

Initial Concerns



- Added complexity to the environment
 - IC EDA environments are already very complex

- Database structure impositions
 - DDMs require a particular organization of data
 - Would this be compatible with our needs & habits?
 - Would it be flexible enough?

- Yet more nomenclature
 - We were already facing training concerns, moving to new tools
 - What is the training ramp up?

More Initial Concerns



- Database fail safe
 - Is the database accessible if the DDM fails?
 - Is the data accessible from any tool, at any time?

- Productivity
 - Will a DDM enhance productivity?
 - Or will it be a detractor?

- Casual observer support
 - Would users external to the project be able to access the data without jumping through hoops?

- Database security
 - Can we restrict access to project databases?

My Initial Reaction



- **Do *I* have to use it?**
- Will the Cadence setup work without it?
 - No, it didn't
- So, I spent a week reworking the setup so I wouldn't have to use the DDM.

Revelation



- Before I was able to start the new project...
- I was called in to troubleshoot on an existing project that was running with the DDM.
- I was implementing heavy modifications and releases to PDK devices and models.
- Hey, this DDM integration rocks!
 - Version control
 - Tags
 - Revision Search Order (RSO)
- Just the ticket for releasing PDKs or library IP to the working groups.

Enter the Project



- The company:
- **Enabling the next generation of innovation.**
- As a world leader in test, measurement and monitoring, Tektronix enables innovation in all its forms. Whenever you view a Web site, click a mouse, make a cell phone call, or turn on a TV, you touch the work of Tektronix.

Enter the Project

- A small RFIC that contains all the functionality for a Time Domain Reflectometer (TDR) signal source.
- 50GHz step generator



DSA8200: The Best Fit for Serial Data Link Analysis



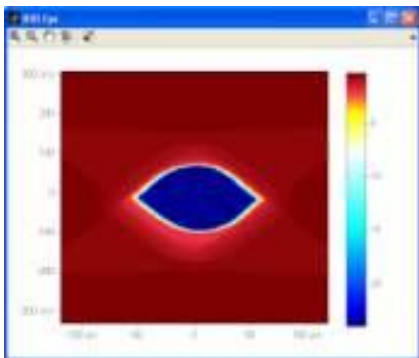
DSA8200 Digital Serial Analyzer

- ▶ Superior measurement system fidelity with up to 4 true differential channels
- ▶ Lowest noise floor electrical modules
- ▶ Highest vertical and horizontal resolution
- ▶ Ultimate CR



TDR/TDT/IConnect for Serial Data Network Analysis

- ▶ 50 GHz TDR/TDT system
- ▶ 50 GHz S-Parameter measurements, highly accurate impedance and loss measurements
- ▶ Up to 1M record length



80SJNB – Jitter Noise, BER and Link Analysis

- ▶ Advanced Transmitter Analysis with SSC support
- ▶ Complete signal characterization with de-embedding
- ▶ “Complete Link” – channel emulation, equalization (FFE/DFE)
- ▶ Separation of Jitter & Noise into deterministic & random components; at the comparator
- ▶ Eye contour and BER eye calculations at the comparator

Tektronix Solution

- Easy to use, high throughput and cost effective solution for Serial Data Network Analysis Applications
 - **Leading TDR** performance and S-parameter bandwidth
 - **True differential** TDR for accurate measurements of differential devices
 - Fully **integrated remote sampler** for measurement flexibility
 - Acquisition and TDR **deskew** – any number of channels
 - **TDR autose**t with or without incident edge included



Back to the Project



- Two-person team

- One primary IC designer
 - Full time

- One primary technologist
 - Helping out on the side

- Same building but different floors
 - Technologist had an injured knee

Decision Point



- Do we deploy the project on the DDM?
 - The designer had never used it and was just coming up to speed on Cadence.
 - I had just created a way to avoid it.

- Yes, absolutely!

- It was an easy sell.

The Reasons

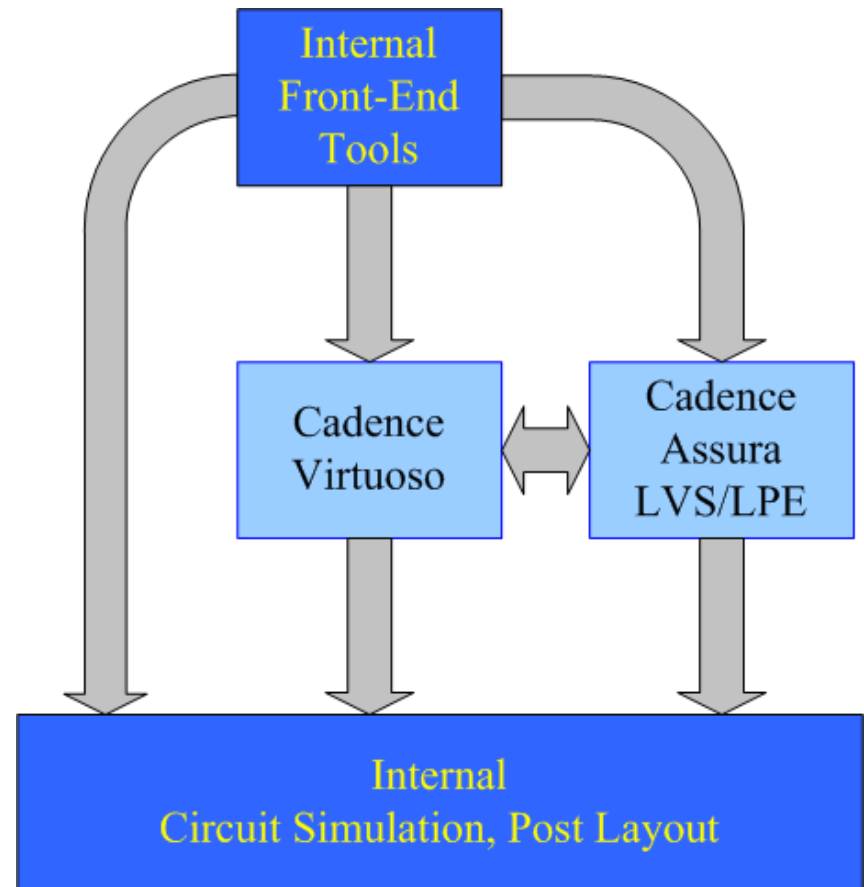


- The implementation was simple enough.
 - Project and supporting PDK
- It was only taking users a few days to become comfortable with the DDM basics.
 - History from the previous project
- We could check point and share data for debugging.
 - Check-in, check-out
- The designer could easily control which versions of PDK IP he was working with.
 - Version control, easy to use interface
- The technologist could experiment with actual project data without risk to the project, or disrupting the designer.
 - Local branches, concurrent check-out or local copies
- All data modifications are traceable.

The Tool Set

Let's take a look at the CAD flow and DDM

- In-house front-end tool set
 - Schematic capture
 - Circuit simulation
 - Circuit debug
 - Experiment management
- Cadence back-end tools
 - Virtuoso layout
 - Assura DRC, LVS, LPE
- ClioSoft, SOS DDM
- Ansoft, HFSS



DDM Requirements



- Version control
- Snapshot, revision tagging
- Cadence integration
- Database fail safe
- Easy integration into existing tool flow and IT systems
- GUI & command line interface for scripting
- Integration with other tools
- Integration with Open Access database

DDM Choice



- ClioSoft's SOS
- Works as an extension to Cadence
 - No special library manager
- Easy to learn and use
 - Minimal new nomenclature
 - Minimal intrusion to work flow
 - SOS user interface is intuitive
- Creation of projects and user work area is straight forward
 - Very easy to script
 - Users, even casual users, can create their own work areas for any project
- Promotes a clean archival mechanism
 - Can even archive in place, using tags

Design Aware Integrations

Authentication & Access Controls

Global Collaboration

Design Reuse

Integrated with Issue Tracking

Release & Derivative Management

Version Control for Files & Directories

SOS
viaDFII

Cadence- Virtuoso

Issue Tracking

Trac
Bugzilla

Universal DM
Adaptor

Other Flows

SOS API + Command Line Interface

SOS
Design Data Collaboration Platform

Meet Your Design DM Challenges



Design DM Challenges

Large Globally
Distributed Teams

Complex Flows &
Multiple Tools

Extremely Large &
Complex Data Sets

ClioSoft DM Solutions

Client-Server & Cache Architecture

Reference & Reuse across the WAN

Security, Access Controls & Visibility

'Design Aware' Integration with EDA Tools

Event Triggers & Project Defined Attributes

C API & Command Line Interface

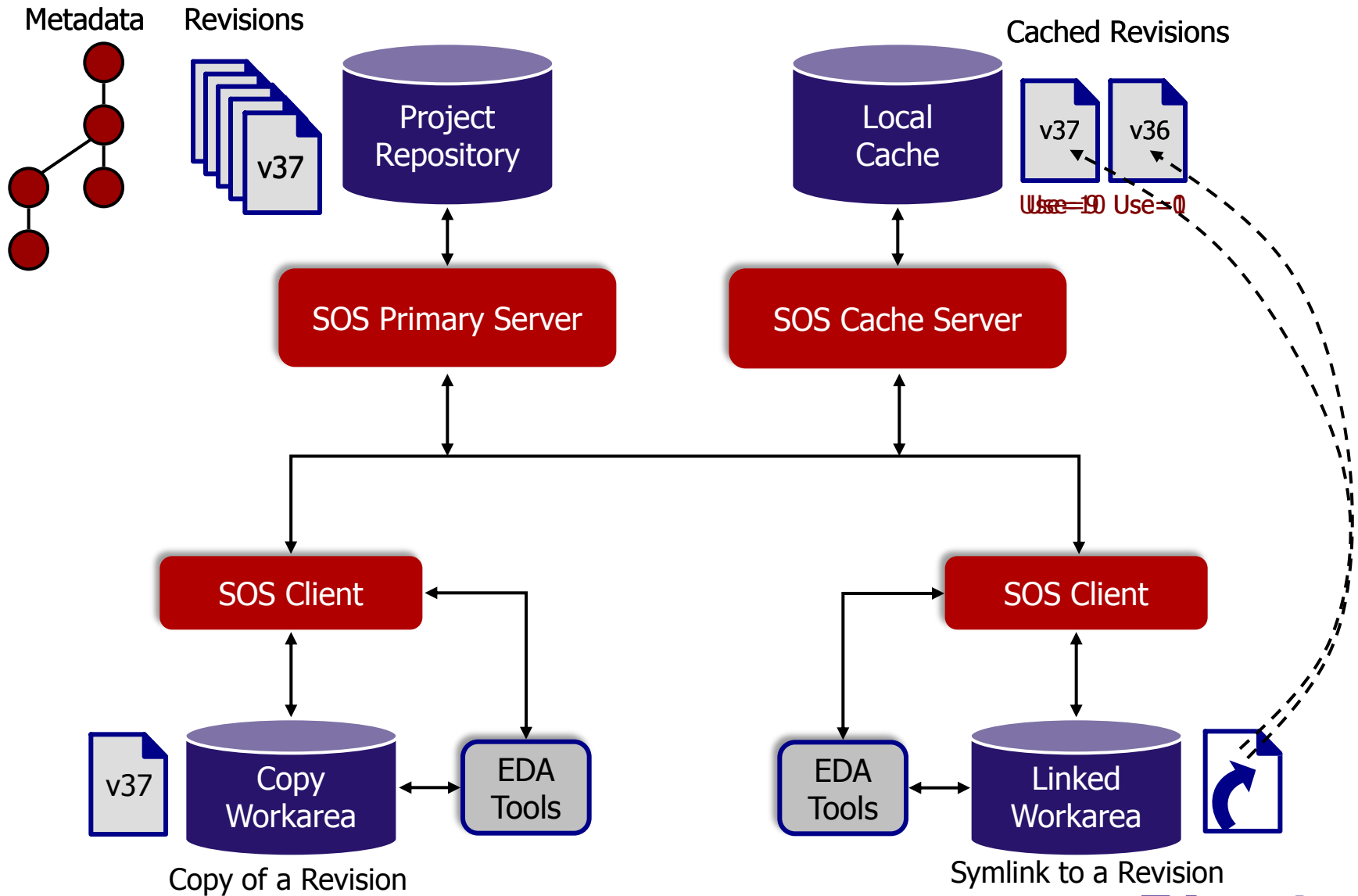
Version Control of Files & Directories

Linked, Sandbox, or Shared Workareas

Composite EDA Objects

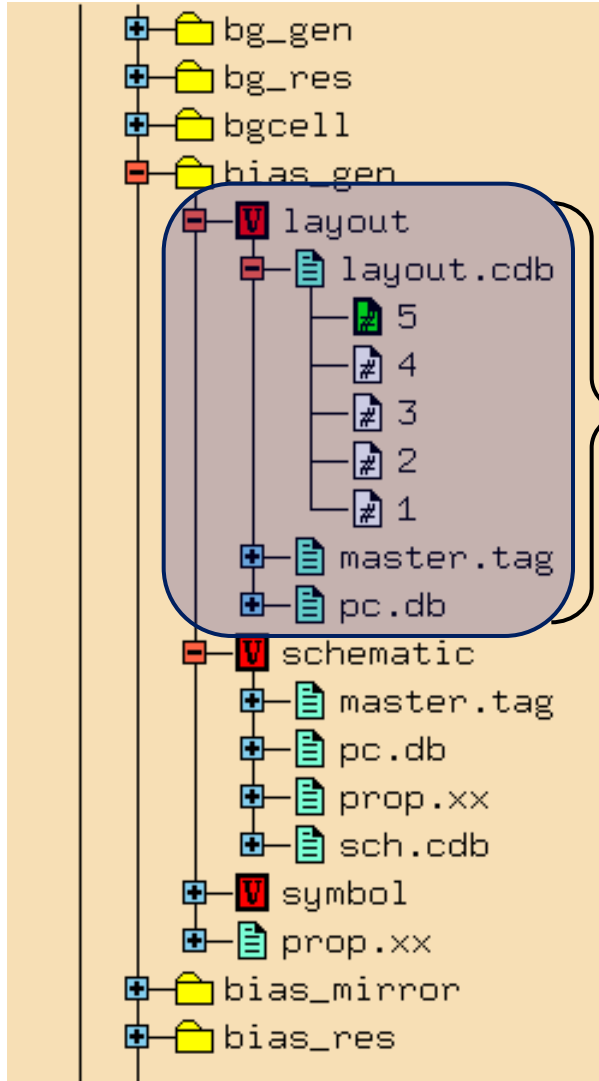
Easy to Setup, Use & Administer

Architecture



Cell-view as a Single Composite Object

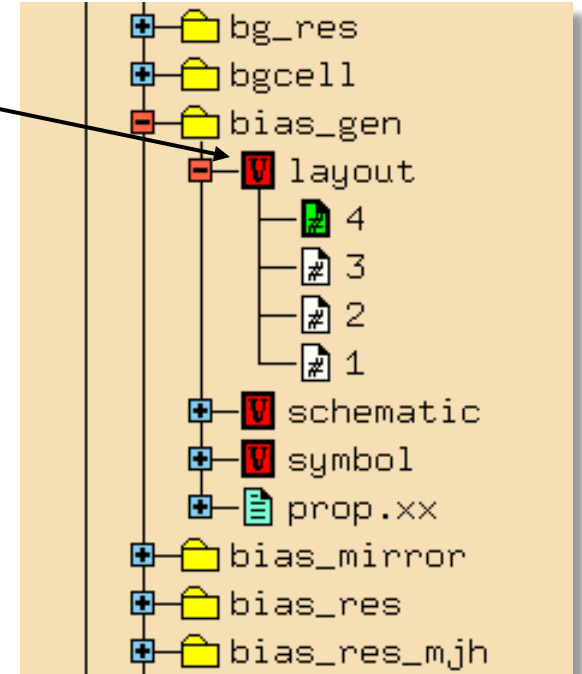
Cell-view managed as files



View directory & files are managed as a single composite object in SOS

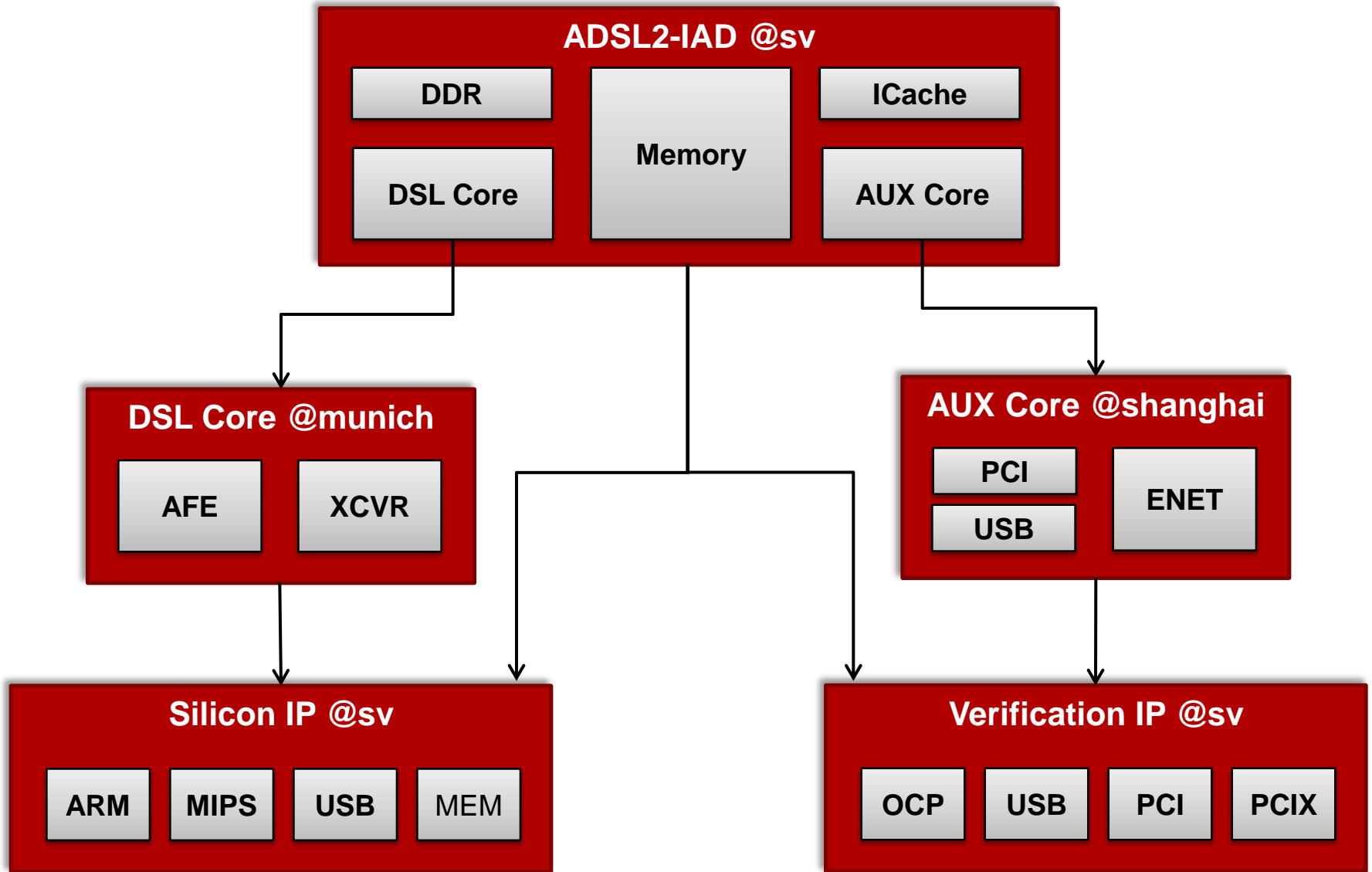
Cell-views such as schematics and layout consist of multiple files

Cell-view as a Composite Object



- # Objects in project reduced 3-4x
- Improved performance
- Data integrity of the cell-view
- Manage composite objects from any tool

Hierarchical References & Reuse



SOS Client GUI



SOS-5.40: <no server> @ /home/demo/cliodemo/demo/design

File Project Modify Attrs Select Tree Revision Help

Server: CLIO Project: demo Work Area: /home/demo/cliodemo/demo/design # Selected: 1 # Checked Out: 1

Hierarchy	Locked	% Cover	Change Summary
<ul style="list-style-type: none"> └─ Cadence-Virtuoso └─ Mentor-ICStudio └─ Sicanvas-Laker └─ firmware └─ rtl <ul style="list-style-type: none"> └─ netif.v <ul style="list-style-type: none"> └─ # 4 <ul style="list-style-type: none"> └─ design_done └─ design_verified └─ # 3 <ul style="list-style-type: none"> └─ release_1.0 └─ # 2 <ul style="list-style-type: none"> └─ plan_b <ul style="list-style-type: none"> └─ # 2 └─ # 1 └─ # 1 <ul style="list-style-type: none"> └─ rxjitbuf.v └─ sigmaplus.v └─ tdmif.v └─ txq.v └─ scripts └─ specs └─ tests <ul style="list-style-type: none"> └─ .sosrc └─ .synopsys └─ protocol_tests └─ .cdsinit └─ cdsLibMgr.il 			Referenced Cadence startup files from reference proj Automatically checking in directory. Initial revision. Added interface.c and network.c Initial revision. Merged branch plan_b. Power optimization Merged branch pla Fixed issue 34. Fixed race condit Try alternative i Initial revision. Timing optimizat Initial revision. Support PCI-X pro Fixed protocol er Added tcl globals Initial revision. Initial revision. Added plot default Automate DC setup Common protocol t Virtuoso startup Cadence Lib Mgr s

Create
Chk Out
Chk In
Tag
Diff

File -> Plot #1

Left Y: line_count Right Y: issue_fixed

From: Start Time: 2004/05/22 17:00:00 To: Now Time: 2004/05/31

Title: Project Stability Metrics. # of Points: 8

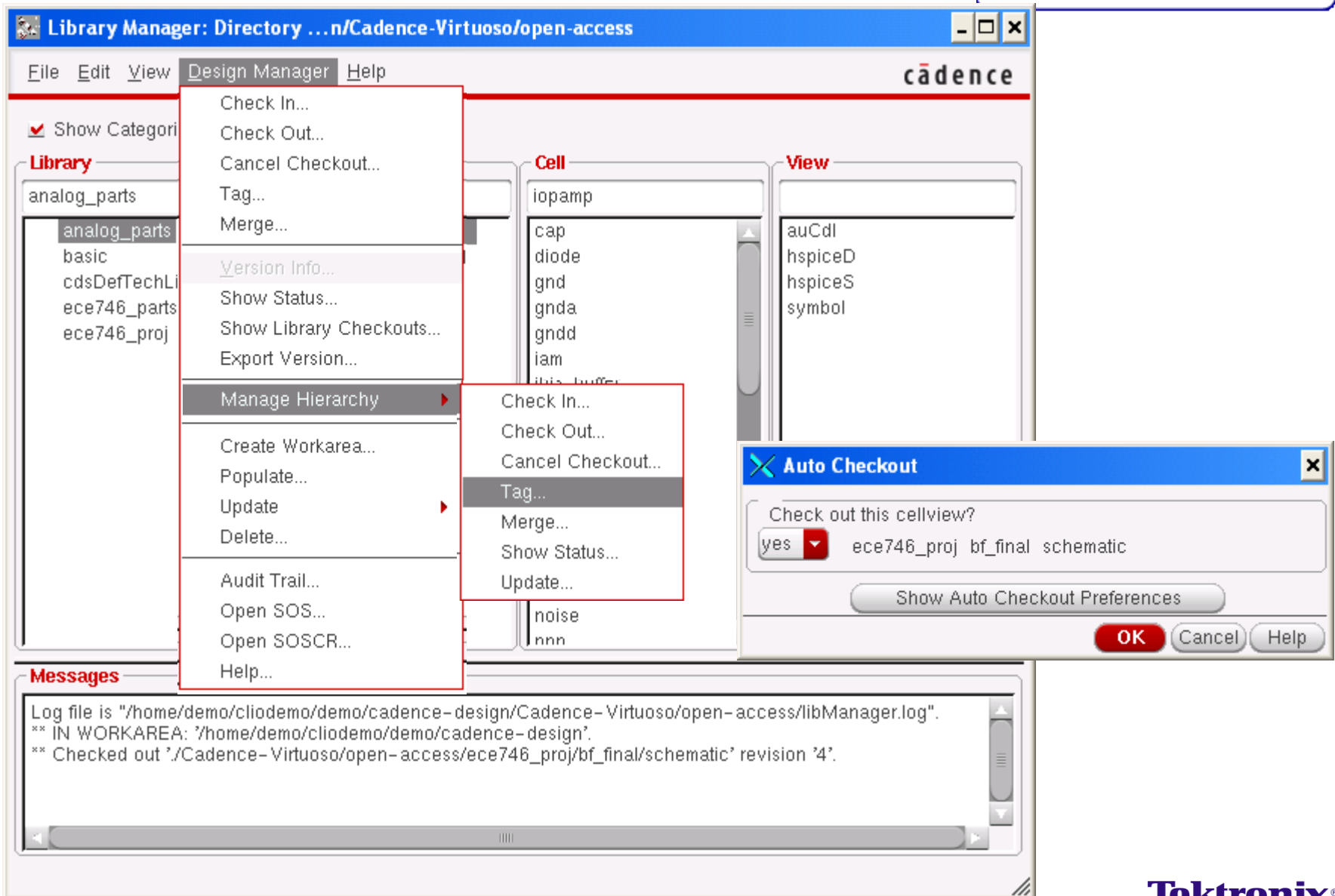
Project Stability Metrics.

Date	# Lines	# Issues Fixed
2004/05/22	0	0
2004/05/23	~3000	~15
2004/05/25	~12000	~75
2004/05/26	~22000	~95
2004/05/27	~22000	~95
2004/05/28	~20000	~65
2004/05/29	~20000	~35
2004/05/31	~21000	~15

Generate New Dismiss

** Checked out './.synopsys' revision '1'.

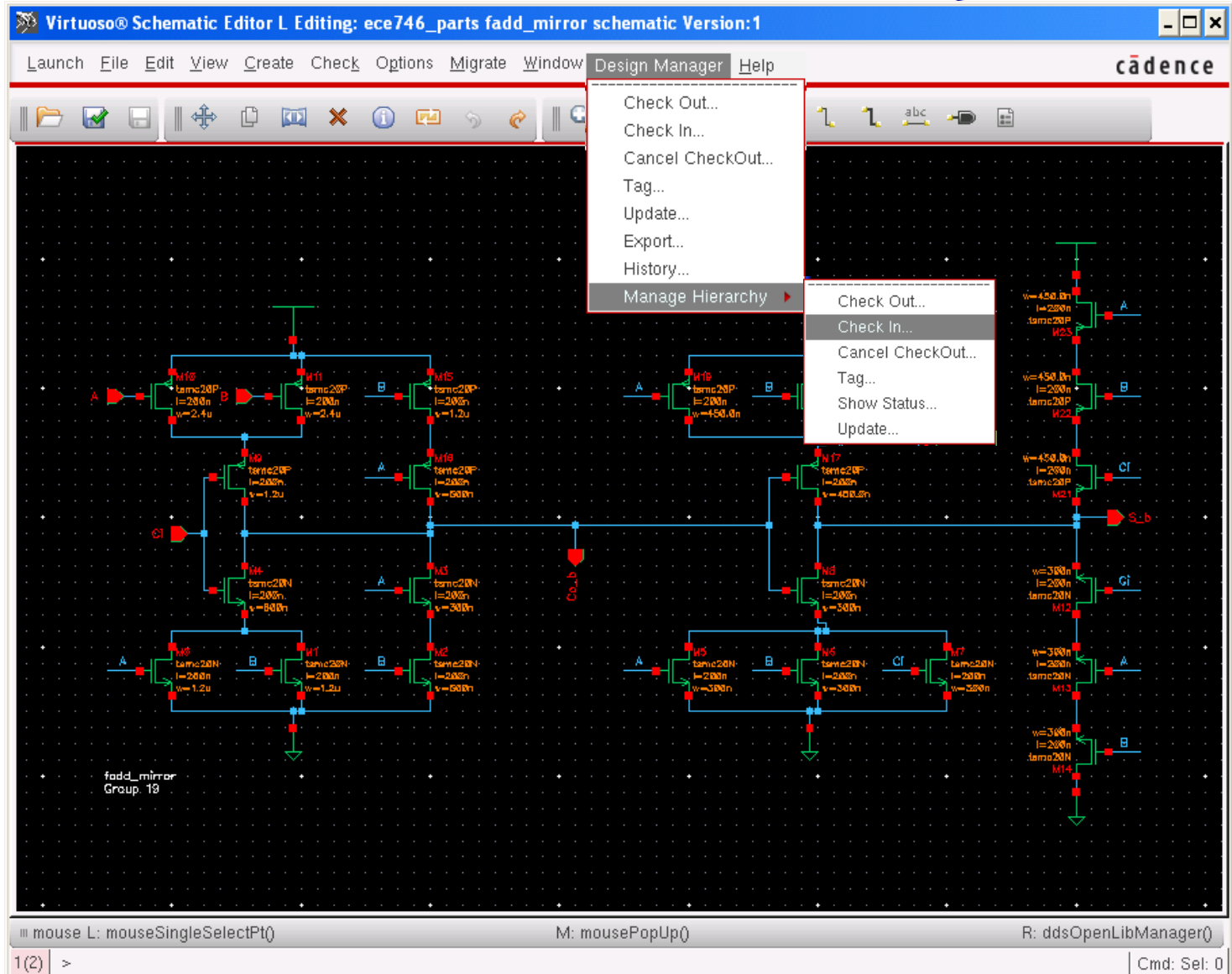
SOS DM in Cadence Library Manager



The screenshot displays the Cadence Library Manager interface. The main window title is "Library Manager: Directory ...n/Cadence-Virtuoso/open-access". The menu bar includes "File", "Edit", "View", "Design Manager", and "Help". The "Design Manager" menu is open, showing options such as "Check In...", "Check Out...", "Cancel Checkout...", "Tag...", "Merge...", "Version Info...", "Show Status...", "Show Library Checkouts...", "Export Version...", "Manage Hierarchy", "Create Workarea...", "Populate...", "Update", "Delete...", "Audit Trail...", "Open SOS...", "Open SOSCR...", and "Help...". The "Manage Hierarchy" option is selected, opening a sub-menu with "Check In...", "Check Out...", "Cancel Checkout...", "Tag...", "Merge...", "Show Status...", and "Update...". The "Tag..." option is highlighted. In the background, the "Cell" pane shows a list of components including "iopamp", "cap", "diode", "gnd", "gnda", "gndd", "iam", "this_buffer", "noise", and "nbn". The "View" pane shows "auCdI", "hspiceD", "hspiceS", and "symbol". An "Auto Checkout" dialog box is open in the foreground, asking "Check out this cellview?" with a "yes" button selected. The dialog also shows the path "ece746_proj bf_final schematic" and a "Show Auto Checkout Preferences" button. The "Messages" pane at the bottom displays the following log entries:

```
Log file is "/home/demo/cliodemmo/demo/cadence-design/Cadence-Virtuoso/open-access/libManager.log".  
** IN WORKAREA: '/home/demo/cliodemmo/demo/cadence-design'.  
** Checked out '/Cadence-Virtuoso/open-access/ece746_proj/bf_final/schematic' revision '4'.
```

SOS DM in Cadence Editors



Excellent Technical Support



- Round the clock support from California & India
- Timely 'Virtually Onsite' support using WebEx Online Remote Support service
- Quick response to fixes and enhancements

Features We Really Made Use of:



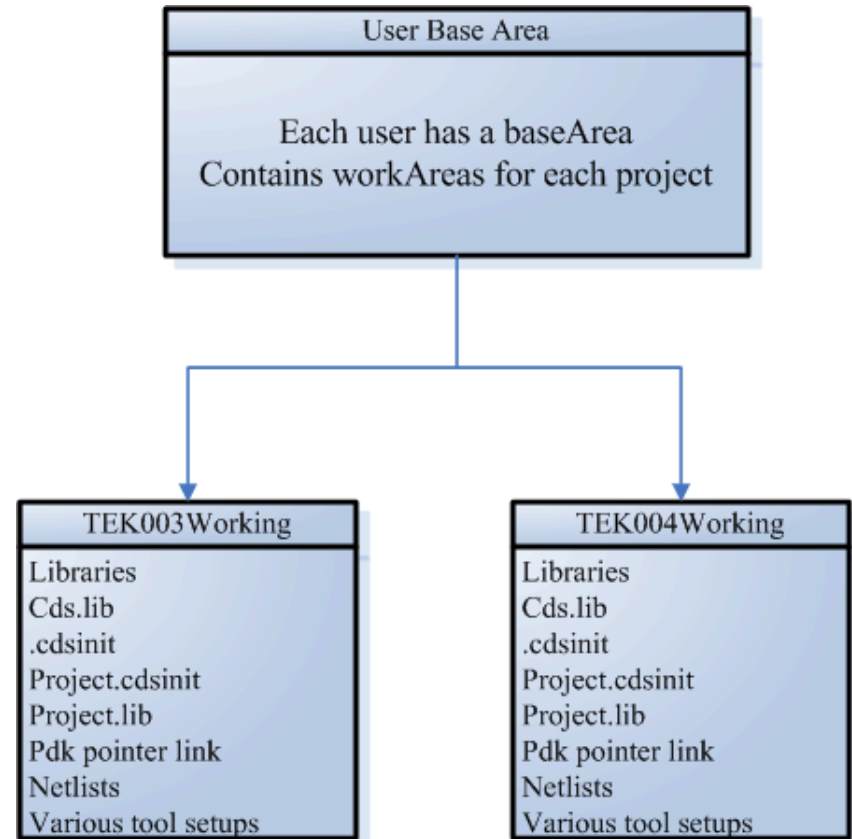
- Version control
- Snapshot
 - Remember exact configuration including file revs and directory structure
- Branch
 - Individual Files, Directories, or Composite Objects
- Revision search order/rule
 - Ordered list of labels to determine revisions to be placed in workarea
 - Manage releases and derivatives while being fully aware of development on all branches
 - Rollback to any RSO at any time
- Maintain Database
- Used for many purposes
 - Configuration snapshot for each tapeout, 1st clean top LVS,...
 - What changed since it worked?
- Returning to a previous configuration



- We added the following widgets:
 - Script to create a new project
 - About 150 lines of Perl
 - Script to create a new user base area
 - About 50 lines of Perl
 - Script to create a new user project work area
 - Included in above
 - Misc. utilities
 - Various report generators
 - Bring up and shut down the servers
 - Various release checking scripts

Project & User Architecture

- Each user has a baseArea
 - Contains project workAreas
- Each user has at least one project workArea
 - Contains all the project data
 - Contains all the setup to run the tools
- The users can have as many workAreas as they need
 - Convenient when you are working with multiple teams



Project Setup

- Each project is setup so to run all the tools without user setup.
- 1. Make a project workArea
 - Single script invocation
- 2. Make a symbolic link to the PDK
 - `Ln -s <pdk path> pdk`
- 3. Fire up the tool
 - `lcfb&`

It takes about 5 minutes to create a project workArea and start working in Cadence.

Our General DDM Experience



- Invaluable for creating, maintaining and deploying PDKs
 - Owned by the technology team
- Extremely useful for common IP libraries
 - Owned by the users
- Allowed us to create a truly painless user deployment system
 - This allows both team members and casual observers to jump on to any project in minutes, without any assistance.
- Allows technology personnel to easily jump back and forth between many projects.
 - Pop into the appropriate work area, hit update and fire up Cadence

Summary



- For a while, we allowed the individual team leaders to choose if their project was going to be under SOS or not.

- Not one leader chose to work without the DDM!
 - The size of the project doesn't seem to matter.
 - It is just as useful for a single person project.

- We have since stopped asking and just deploy the projects set up for SOS.

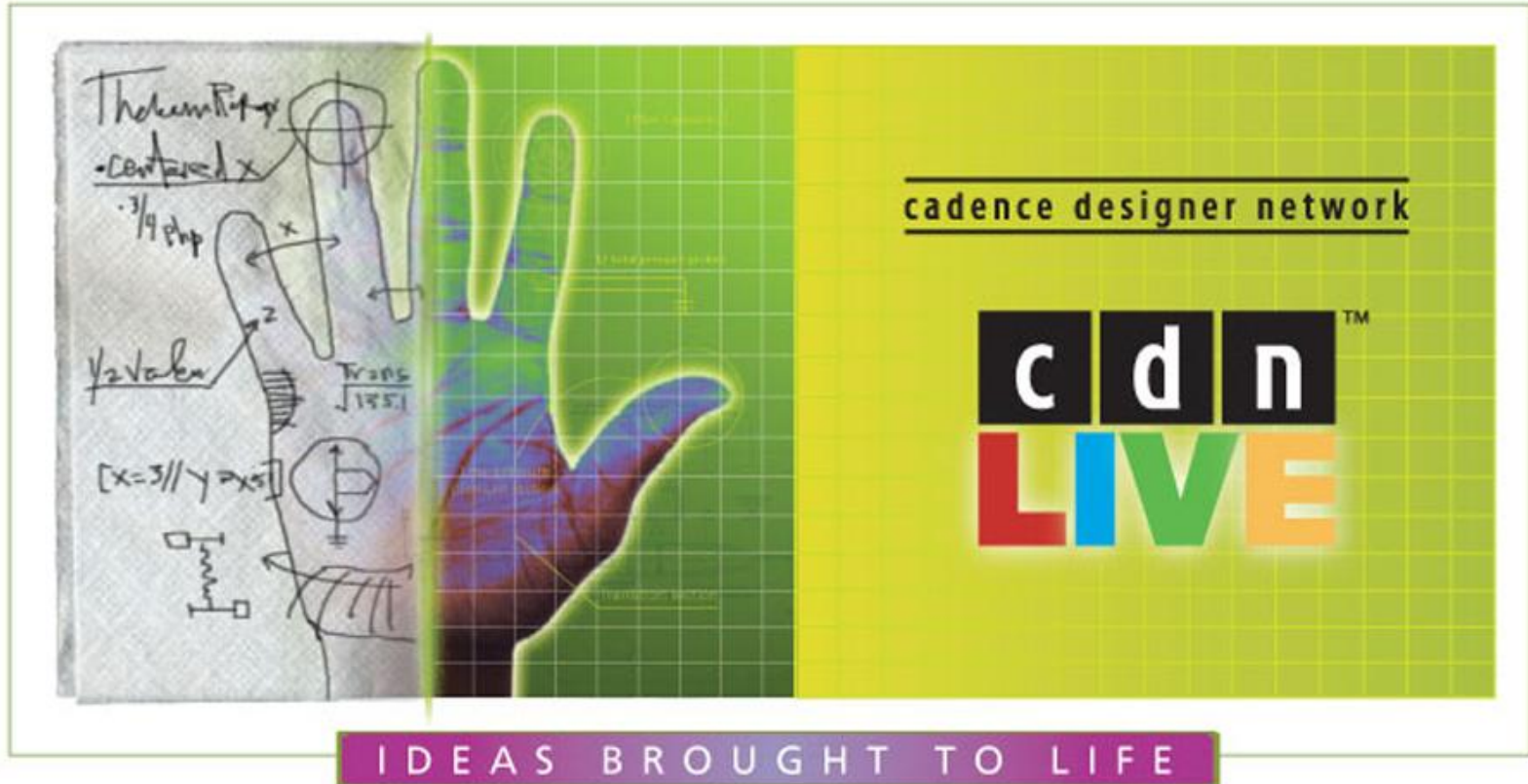
Our Directions Forward



- Integration of more project data into SOS
 - Would like to have all the project data, except temp files, under the project workArea.
 - We are getting there but there are still some outliers.

- Integration of more tools into SOS
 - The ability is there, especially with ClioSoft's new universal DM adaptor (UDMA).
 - Many tools don't require integration, because of the design.

- Take a look at the new Enterprise Edition
 - UDMA
 - Hierarchical work areas



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